Consideration of Background Concentrations in Cleanup Decision-Making			
	Soil Contamination	Vapor Intrusion	Sediment Contamination
Sources of Background Levels	• Non-anthropogenic releases (PAHs from forest fires, crustal elements, etc.) • Global contamination (e.g. nuclear fallout, long-range transport of persistent chemicals) • Releases from local sources (auto emissions, industrial releases, wood stoves, other sites, etc.)	• Global contamination (limited implications for VI chemicals) • Local sources that contribute to outdoor air levels (cars, industrial/commercial sources, wood stoves, etc.) • Indoor sources (solvents, building materials, etc.)	• Non-anthropogenic releases (PAHs from forest fires, naturally occurring metals etc.) • Global contamination (e.g. nuclear fallout, long-range transport of persistent chemicals) • Diffuse urban inputs (e.g. aerial deposition into waterways, non-point source run-off, sediment transport from urban watersheds) • Releases from local sources (storm water, point sources, other cleanup sites, etc.)
Current Definitions	• **"Area background"** means the concentrations of hazardous substances that are consistently present in the environment in the vicinity of a site which are the result of human activities unrelated to releases from that site. (WAC 173-340-200) • **"Natural background"** means the concentration of hazardous substance consistently present in the environment that has not been influenced by localized human activities….[i] (WAC 173-340-200)	• MTCA definitions of "**area**" and "**natural**" background are currently applicable to the VI pathway. Practical application is questionable.	• "**Non-anthropogenic background**" not defined in Sediment Management Standards. • MTCA definitions of "**area**" and "**natural**" are currently used in MTCA sediment cleanups, but can be ambiguous when used for sediment. Achieving "natural" background not feasible in some urban areas of Puget Sound. • Option 2 proposes another definition of "**Sediment Regional Background**" that may allow higher sediment cleanup levels for some contaminants in urban areas.
Current Data Requirements	• When determining natural background concentrations for soil, a sample size of ten or more background soil samples shall be required. • When determining area background concentrations for soil, a sample size of twenty or more soil samples shall be required. (WAC 173-340-709(4))	• The number of samples for other media shall be sufficient to provide a representative measure of background concentrations and shall be determined on a case-by-case basis. • Draft VI Guidance does not provide further detail on sample numbers.	Not specified in Sediment Management Standards. To be determined.
Current Metrics	• For lognormally distributed data sets, background shall be defined as the true upper 90th percentile or four times the true 50th percentile, whichever is lower. • For normally distributed data sets, background shall be defined as the true upper 80th percentile or four times the true 50th percentile, whichever is lower. • Other statistical methods may be used if approved by the department. (WAC 173-340-709(3)	• The general MTCA rule requirements for characterizing background concentrations are applicable to the VI pathway. • Limited number of site- or building-specific samples (particularly for indoor air) preclude use of most statistical evaluations.	Not specified in Sediment Management Standards. To be determined.

Consideration of Background Concentrations in Cleanup Decision-Making (Continued)			
	Soil Contamination	Vapor Intrusion	Sediment Contamination
Implications for Cleanup Investigations	• US Geological Survey completed study to characterize natural background levels for metals.		• For the seafood ingestion pathway, most carcinogenic chemicals have risk-based sediment cleanup levels that are below natural background. If natural background concentrations are not known for an area, will have to collect background sediment data to screen contaminants.
Implications for Cleanup Standards	• Risk-based MTCA cleanup levels are sometimes less than natural background levels (e.g. arsenic). In those situations, the cleanup level shall be established at a concentration equal to the natural background concentration. (WAC 173-340-700(6) + media-specific sections)	• Draft VI Guidance recommends subtracting ambient background from measured indoor air values.	• Most carcinogenic chemicals have risk-based sediment cleanup levels that are below natural background. • PLP may need to collect sediment data to determine natural background levels to set cleanup levels. • For some chemicals, such as dioxins and PCBs, natural background concentrations from cleaner areas of Puget Sound are very low compared to ambient concentrations in urbanized areas.
Implications for Remedy Selection	• When area background concentrations (see WAC 173-340-200 for definition) would result in recontamination of the site to levels that exceed cleanup levels, that portion of the cleanup action which addresses cleanup below area background concentrations may be delayed until the off-site sources of hazardous substances are controlled. In these cases the remedial action shall be considered an interim action until cleanup levels are attained.(WAC 173-340-360(4)(d))		• In some cases, if natural background is set for sediment cleanup level, may be difficult to define site boundaries because entire embayment is above natural background concentration. • In some cases, natural background concentrations are not technically feasible to attain, and are not sustainable. Sediment redistribution or continuing sources of contaminants cause recontamination of the site. • For aquatic environments, there is less flexibility to implement institutional controls that limit exposure routes. • Area background can be used for interim actions, but does not resolve PLP liability.
Implications for Post-Cleanup			• Recontamination of cleanup sites is a serious problem, particularly in urban areas that have many sources. • Source control is needed to reduce inputs of contaminants, but source control has technical, regulatory, and financial constraints. • PLP does not want to be held liable for recontamination of their site that they did not cause.

Consideration of Background Concentrations in Cleanup Decision-Making (Continued)			
	Soil Contamination	Vapor Intrusion	Sediment Contamination
Potential Issues	• Terminology – Continued use of the term "natural background"? • Use of non-parametric statistical methods. • Updating methods for handling non-detects. • Development and use of state-wide values for key organic compounds • Institutional controls • Areawide soil contamination policies and procedures	• Number and location of samples. • Statistical measures used to characterize background (e.g. 90th percentile, UTL, maximum) • Use of national data and concentration distributions for indoor and outdoor air.	• Ambiguity in background definitions can make it difficult to apply to sediment. • Need sediment background data to screen sites and determine cleanup levels. • For some chemicals, "natural" background in cleaner areas of Puget Sound are not attainable or sustainable in urban embayments. • Source control is needed to reduce inputs that may recontaminate sites. • Need to clarify definition and statistical methods for sediment background concentrations.

[i] For example, several metals and radionuclides naturally occur in the bedrock, sediments, and soils of Washington state due solely to the geologic processes that formed these materials and the concentration of these hazardous substances would be considered natural background. Also, low concentrations of some particularly persistent organic compounds such as polychlorinated biphenyls (PCBs) can be found in surficial soils and sediment throughout much of the state due to global distribution of these hazardous substances. These low concentrations would be considered natural background. Similarly, concentrations of various radionuclides that are present at low concentrations throughout the state due to global distribution of fallout from bomb testing and nuclear accidents would be considered natural background.